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CURRENT LITERATURE.

BOOK REVIEWS.

The morphology of spermatophytes.¹

THIS volume forms the first part of a treatise on seed plants. The reputation of the senior author as a lucid and interesting writer is well borne out in the present instance. The illustrations, which in many cases are obviously due to the junior author, are admirably executed when original, and well chosen where they are drawn from earlier publications. The typography and general make-up of the book are creditable.

As is stated in the preface, the present volume grew out of a course of lectures, accompanied by laboratory work, and it shows throughout a command of the most recent literature and a knowledge at first hand of all the morphological facts which may be investigated in a well equipped laboratory in the temperate region of the United States. It presents original views in regard to morphological terminology and phylogeny, while concerning *Ginkgo* and the *Coniferales* a considerable amount of original information is supplied.

The extant Gymnosperms are divided in accordance with the results of recent investigations into four classes, the *Cycadales*, *Ginkgoales*, *Coniferales*, and *Gnetales*. The information supplied concerning the first class incorporates the important recent works of Ikeno, Webber, and Lang on the gametophyte. The interesting genus *Ginkgo* is elevated on the basis of the researches of Hirasé, Webber, and Seward into the representative of a group (*Ginkgoales*) distinct from the *Coniferales*. We find here a considerable amount of original information concerning the earlier and later stages of the seed, including several good figures and photomicrographs. More space is naturally given to the *Coniferales* than to any other class of Gymnosperms, since they are the representative group of the present day. In this connection we find an excellent photograph illustrating the heteromorphy of certain coniferous seedlings. The account of the reproductive organs is mainly based on the original examination of *Pinus Laricio*. The photomicrographs and figures in this section are particularly fortunate, especially those figures illustrating the development of pollen and of the embryo. The authors express the opinion that the genus *Pinus* is perhaps the most specialized representative of the group. Towards the much disputed question of the

¹ COULTER, JOHN M., and CHAMBERLAIN, CHARLES J.: Morphology of Spermatophytes. Part I. Gymnosperms. 8vo. pp. x + 188. figs. 106. New York: D. Appleton & Co., 1900. \$1.75.

morphology of the ovuliferous scale of the Coniferales they occupy a judicial attitude, although obviously inclining to the view that in the Pinaceae at any rate it is to be regarded as a modified shoot in the axil of the sterile bract. Concerning the treatment of the Gnetales little need be said. Although of necessity presenting no original features it summarizes the most recent literature.

In its treatment of the fossil Gymnosperms the present work is far beyond any previous American botanical work. The Cordaitales receive a sufficient consideration, illustrated chiefly by Renault's well-known figures. The extinct cycadoid group, the Bennettitales, is fully discussed from the standpoint of the existing literature, and an interesting account, in part original, is given of the recently discovered microsporophylls of the group, which as yet have been found in a state of suitable preservation only in the United States. The microsporangia occur in synangial sori on the abaxial surfaces of the sporophylls, thus resembling at once Cycas and the marattiaceous ferns. A further interesting feature is that the strobili in this group were not unfrequently bisporangiate, bearing both megasporophylls and microsporophylls.

The work closes with chapters on the comparative morphology, phylogeny, and geographical distribution of the Gymnosperms. As regards comparative morphology the authors have almost entirely excluded vegetative anatomy from their work, and among so many admirable illustrations of the external features and reproductive organs of living and fossil Gymnosperms there are few or none representing anatomical structures of the vegetative organs. The present volume is destined to have such an important influence on the study of Gymnosperms on our continent, that it is impossible not to regret that its authors have not done something to direct the attention of American botanists to the importance of anatomical studies, so much neglected as yet in North America. The work of European palaeobotanists has apparently finally set at rest the claim that the reproductive organs of the higher plants are the only trustworthy guide in matters of morphology and phylogeny. It appears to be established as a result of the work of the late Professor Williamson and his followers that the fibrovascular skeleton of plants is quite as important phylogenetically as the osseous skeleton has proved to be in the case of animals. The Calamities and Sigillariae, for example, were put by Williamson, on account of the constant and characteristic features of structure of their vegetative organs, with the Equisetales and Lycopodiaceae respectively, in opposition to Brongniart who placed them among the Gymnosperms. The subsequent discovery of their reproductive organs by Williamson and Zeiller only confirmed Williamson's predictions. At the present time the Cycadofilices, a group on anatomical grounds alone considered transitional between the Filicales and Gymnosperms, are in the same position as that formerly occupied by the Calamites and Sigillariae.

The actual condition of our anatomical knowledge seems to justify the general statement that the skeletal features of plants are even more conservative than their reproductive organs, and of quite as great importance in establishing the phylogenetic grouping of the Vasculares.

Turning to phylogenetic matters, the authors consider with Potonié and Scott that the Cycadofilices form the connecting link between Ferns and Gymnosperms. This group they believe to have given rise in all probability to two series, the Bennettitales and the Cordaitales. From the former the Cycadales were derived at a later date, while from the latter stock branched off subsequently the Ginkgoales and Coniferales. The significance of this phylogenetic tree would be more apparent had the earlier part of the book given a better illustrated account of the Cycadofilices and the Cycadofilicinean features of the living and extinct Gymnosperms.

The present admirable volume is indispensable to every botanist, and the reviewer may perhaps express the hope that in the second edition, which will doubtless soon be called for, the authors will add to its usefulness by a well illustrated summary of the relevant points of vegetative anatomy.—
E. C. JEFFREY, *Toronto*.

Bergen's botany.

WHEN there began a revulsion against the teaching of botany from the floral standpoint, Bergen's *Elements of Botany* was one of the most helpful text books, because it looked toward the introduction of the student to the more vital phases of botany. The book met instant and increasing success, because it was just different enough from the former texts to attract the teacher who felt the need of a change, and not so different as to repel the teacher who was willing but not anxious to find a new guide.

The *Foundations of Botany* recently issued² is in some sense a revision of the older book. It is said to be written upon the same lines, but it differs from the *Elements* in the extension of the portion treating of cryptogams, and in the introduction of a section on ecology. The adoption of these features, which characterize several of the more recent texts, is an acknowledgment that the lines on which they proceed are approved by teachers, and evidence that the publishers desire to meet this demand. The *Flora*, which in the earlier book was wholly inadequate, has been increased fivefold, and, judging from the title-page, is issued in editions adapted to various sections of the country.

The illustrations are all new and almost without exception admirably selected and well made. Many improvements in the text are also evident, and the book is probably as accurate as any text-book now on the market.

² BERGEN, JOSEPH Y.: *Foundations of botany*. 12mo. pp. xii+412. *figs.* 276. With which is combined: *Bergen's botany, key and flora; northern and central states edition.* pp. 257. *figs.* 25. Boston: Ginn & Co. 1901.